maintaining that the results were modified by the gaseous impurities of the laboratory in which they were obtained. GUTTENBERG,[10] on repeating his experiments in pure air, finds essentially the same compensatory values of light as he found in his earlier work. GUTTENBERG used the seedlings of *Avena* and *Brassica*, forms much less sensitive to impurities than are legumes, with which RICHTER worked. GUTTENBERG finds in *Vicia sativa*, contrary to RICHTER, that laboratory air does not increase the heliotropic sensitiveness, but in agreement with RICHTER he finds the geotropic irritability lessened. On this point, GUTTENBERG'S experiments are much more critical than RICHTER'S.—WILLIAM CROCKER.

Morphology of Phylloglossum.—A recent paper by WERNHAM[11] represent, a type, at the moment becoming much too common, in which a small basis of imperfectly examined facts is made to serve for large conclusions which are neither clearly nor logically drawn. The author has examined by means of serial sections the anatomy of two specimens of *Phylloglossum Drummondii*. He concludes that the basal leaves of this species (the protophylls of certain authors) are microphyllous, although superficially relatively large in sizes because their traces leave the stele without leaving any gap, as is the case with the Lycopsida. Concerning the relation of the sporophyll traces to the vascular system of the axis, the account is very obscure, since it is not made clear whether gaps are or are not present. The most remarkable feature of the article is the interpretation of the larger strand which passes off from the crown of the functional tuber toward the tuber of the succeeding year as a leaf trace. It has been regarded by other observers, apparently with good reason, as a branch supply, and the present author adduces apparently no valid evidence why this view of its nature should not continue to be held. On the basis of this imaginative interpretation, he comes to the conclusion that *Phylloglossum* was originally a megaphyllous form, which has become much reduced. It would be possible to prove almost anything with such reasoning as this. It seems highly desirable that morphologists should avoid eccentric conclusions of the nature illustrated by the article here reviewed. Obviously, conclusions of permanent value in regard to leaves or other organs can be reached only in the case where there is no room for doubt as to the morphological category of the structure under discussion.—E. C. JEFFREY.

Classification of conifers.—A new classification of conifers, based upon morphology, geographical distribution, and geological history, is proposed

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[10] GUTTENBERG, H. R. v., Ueber das Zusammenwirken von Geotropismus und Heliotropismus und die tropistische Empfindlichkeit in reiner und unreiner Luft. Jahrb. Wiss. Bot. 37:467–492. 1910.

[11] WERNHAM, H. F., The morphology of *Phylloglossum Drummondii*. Annals of Botany 24:335–347. *figs.* 8. 1910.

by VIERHAPPER.[12] It is assumed at the outset that a group whose members have in common such striking characters must be monophyletic. The morphology is confined to the grosser taxonomic characters (but includes the structure of the wood), excluding entirely the gametophytic structures, because the new system is based upon facts, and the gametophytes are not yet known in all the genera, and presumably are not yet worthy of recognition among the established facts. The obvious characters are analyzed and classified as primitive and secondary.

The Cordaitinae are the primitive stock, which during the Carboniferous gave rise to the Coniferae, the Taxocupressaceae arising as an offshoot from Ginkgoinae, and the Abietaceae coming directly from the Cordaitinae. The Taxocupressaceae include the Taxoideae and Taxodioideae arising independently from the *Ginkgo* stock during the Carboniferous, and the Cupressoideae arising during the Trias from the Taxodioideae. The Abietaceae include the Araucarioideae coming directly from the *Cordaites* stock, and the Cunninghamioideae and Abietoideae arising from the araucarian stock during the Trias.

Without commenting upon the scheme itself, it would seem to the reviewer that so much is now known about the gametophytes, and that so much of this comparatively recent knowledge is extremely significant, that it must be considered in any classification which claims to represent the phylogeny of a group.—CHARLES J. CHAMBERLAIN.

Cretaceous pine leaves.—In the communication cited the authors describe the anatomy of a species of *Pinus* and a supposed species of *Prepinus*, from the Upper Cretaceous of Hokkaido, Japan.[13] The pine leaf, denoted by the specific name *P. yezoensis*, from the description given is not very different in structure from the living *P. Bungeana* of China, since it is a soft pine with a single foliar bundle and apparently a three-leaved fascicle. In type it clearly differs from the pine leaves of the Lower Cretaceous described by the reviewer, in possessing a degenerate transfusion sheath, a well-marked endodermis, and infolded mesophyll cells. In other words, it is practically indistinguishable in its general structure from the leaf of a living pine. Interestingly enough, in a communication from the reviewer's laboratory, shortly to appear, it will be shown that the wood of a pine from the American Upper Cretaceous likewise resembles more nearly the secondary xylem of living pines than that of pines from the Lower Cretaceous. It will thus apparently be possible to distinguish between these two horizons by means of the nature of the pine flora. The *Prepinus* described, *P. japonicus* (why not *P. japonica?*), appar-

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[12] VIERHAPPER, F., Entwurf eines neuen Systemes der Coniferen. Abhandl. K. K. Zool.-Bot. Gesell. Wien **5**:1–56. 1910.

[13] STOPES, MARIE C., and KERSHAW, E. M., The anatomy of cretaceous pine leaves. Annals of Botany **24**:395–402. *pls. 27, 28.* 1910.